FOREST PRODUCTS
Project Fact Sheet

FAST CURING OF COMPOSITE WOOD PRODUCTS

BENEFITS

- Reduced press energy requirements by 40%
- Reduced CO2 emissions
- Improved product performance
- Mitigated release of VOCs
- Increased productivity

APPLICATIONS

This catalyst technology will lower resin curing time and temperature for composite wood products such as oriented strandboard, medium-density fiberboard, and particleboard. Researchers will also use data generated during this project to strengthen the physical and mechanical properties of the finished boards. The resulting technologies will be applicable to all UF and PF composite wood manufacturers.

New Curing Catalysts Will Reduce Energy Requirements by 40%

Urea-formaldehyde (UF) and phenol-formaldehyde (PF) are highly-effective adhesive systems used in manufacturing composite wood products such as oriented strand board (OSB) and particleboard (PB). However, applying these resins typically requires an energy-intensive curing step consuming 40 trillion Btu per year industry-wide. Previous research has shown that catalysts can reduce energy requirements for applying UF and PF resins by accelerating the curing process.

In this project, partners will analyze the curing process using advanced chemistry tools. Analysis of the curing process will lead to the development of new curing catalysts designed to reduce energy requirements by reducing press temperatures and times. Such catalysts are expected to reduce energy use and CO2 emissions by 40%. As an additional benefit, the catalyst research will provide valuable data on composite wood board properties that can help improve product performance. Researchers will use this data to strengthen physical and mechanical properties of the finished boards and thus reduce product damage caused by wood extractives.

OFFICE OF INDUSTRIAL TECHNOLOGIES
ENERGY EFFICIENCY AND RENEWABLE ENERGY • U.S. DEPARTMENT OF ENERGY

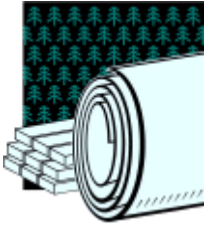
PROJECT DESCRIPTION

Goal: Develop new curing catalysts designed to lower curing temperatures to 125-140 C with times of 0.5-1 minute that will reduce curing energy requirements by 40%.

During the first year, researchers will establish fundamental curing chemistry. Nuclear Magnetic Resonance (NMR) and Differential Scanning Calorimetry (DSC) will provide advanced analysis of wood properties and the curing process. In addition, the impact of wood extractives on the physical properties of composite wood board will also be evaluated using NMR. Year 2 will focus on the development of new curing catalysts. NMR techniques will help establish optimal chemistry for low temperature curing with the new catalysts. Researchers will also assess pretreatments that minimize damage to boards caused by wood extractives.

PROGRESS & MILESTONES

- Researchers will determine curing chemistry by examining the impact of plate pressure and curing temperature and establishing effect of catalysts on UF and PF curing chemistry.
- A pretreatment to minimize the detrimental impact of wood extractives on composite wood products will be evaluated.
- The new catalyst technology will be tested to establish the optimal curing chemistry and to characterize the physical properties of the new, fast-cured composite wood board.
- In 10 years, the new technology is expected to yield the following results:
    - Savings of $3 billion per year for the wood products industry
    - Reduced press energy requirements by 40%



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